

Where to see dinosaur fossils found in Alaska:

Bureau of Land Management Public Information Center, first floor
Federal Building 222 W. 7th Ave.
Anchorage, phone (907) 271-5960

University of Alaska Museum
907 Yukon Drive
Fairbanks, phone (907) 474-7505

University of California
Museum of Paleontology
Berkeley, California
www.ucmp.berkeley.edu

Collecting fossils: What's legal on federal lands?

LEGAL: Non-commercial collection of small quantities of invertebrate fossils, such as fossil shells, corals, leaf imprints, and petrified wood. (Note: In some national park units, collection of any such remains is prohibited, so check first.)

ILLEGAL: Collection of any amount of vertebrate fossils, including bones and teeth remains from dinosaurs, mammoths, and other ancient animals with backbones.

HOW YOU CAN HELP: If you find fossils, especially vertebrate remains, please notify the federal agency managing the discovery area. Your find may help science and the understanding of Alaska's fascinating prehistoric past!



This pamphlet was produced in partnership with the University of Alaska Museum. The BLM is grateful to Dr. Roland Gangloff, curator of Earth Sciences, for supplying much of the information included.

Suggested Readings:

Lambert, David, 1993 *The Ultimate Dinosaur Book*. London: Dorling Kindersley in association with the Natural History Museum of London. (Nicely illustrated with listing and information on all 468 dinosaur genera reported by 1993.)

Currie, Phillip J. and Kevin Padian (editors), 1997 *Encyclopedia of Dinosaurs*. New York: Academic Press. (Very detailed and comprehensive summary of the latest dinosaur information.)

Norman, David, 1991 *Dinosaur!* New York: Prentice Hall. (Great illustrations and fun to read for the advanced beginner.)

Gill, Shelley, 1988 *Thunderfeet: Alaska's Dinosaurs and Other Prehistoric Critters*. Homer, Alaska: PAWS IV Publishing. (Children's story book and audio tape with songs about dinosaurs and other animals from Alaska's past.)

For further information on dinosaurs, visit us on the Internet at:
www.ak.blm.gov/ak930/cultrl.html
or

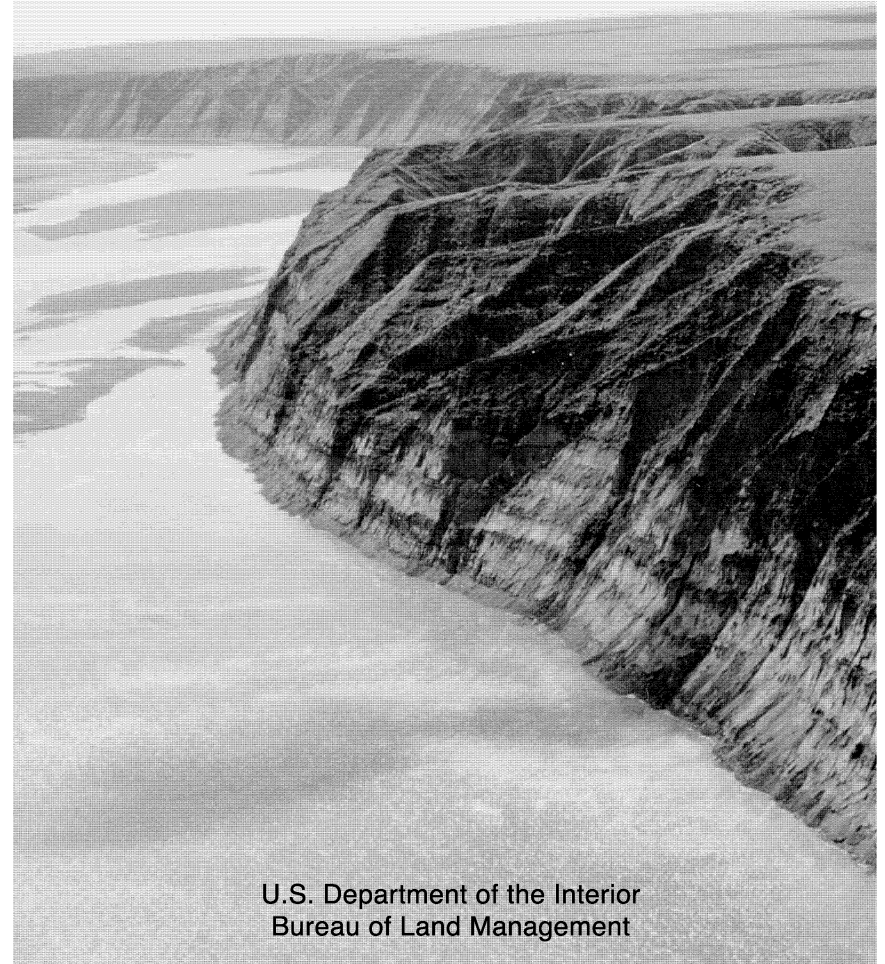
www.ak.blm.gov/ake_trng.html

or contact us at:



BLM/AK/AE-99/012+8152+930 rev 03
Bureau of Land Management
222 W. 7th Avenue
Anchorage, AK 99513
(907) 271-5510
www.ak.blm.gov/

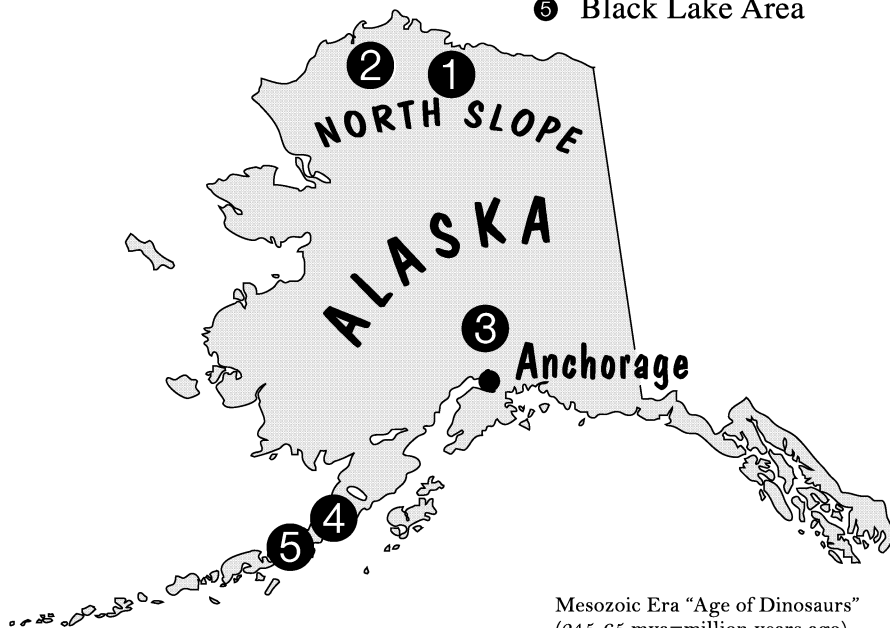
DINOSAURS on Alaska's North Slope



U.S. Department of the Interior
Bureau of Land Management

Alaska's North Slope dinosaurs are of international scientific importance. They lived in places once thought impossible for dinosaurs to survive.

Already the numbers of different dinosaurs found on the North Slope and the amounts of fossils recovered surpass all other dinosaur sites in the rest of the world's polar regions.



Known Dinosaur Sites

- ❶ Colville River area
- ❷ Western North Slope
- ❸ Talkeetna Mountains
- ❹ Aniakchak National Park & Preserve
- ❺ Black Lake Area

Mesozoic Era "Age of Dinosaurs"
(245-65 mya=million years ago)

Triassic Period (245-208 mya)
dinosaurs of this time as yet
unknown from Alaska

Jurassic Period (208-146 mya)
dinosaurs of this time known from
Alaska Peninsula

Cretaceous Period (146-65 mya)
dinosaurs of this time found on
Alaska Peninsula, North Slope, and
in the Talkeetna Mountains.

Cover photo: Cliffs along
rivers on the North Slope
sometimes reveal signs that
dinosaurs lived here long ago.

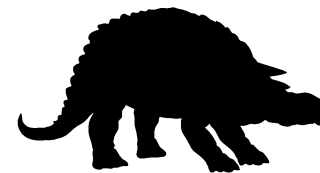
Western North Slope dinosaur finds



Kuk, Kokolik, and Avingak Rivers area: 1980s discoveries at various locations of isolated tracks and skin impressions as reported by field geologists. 2001 discovery of partial hadrosaur lower leg (tibia) bones found with amber. Volcanic ash beds being analyzed to determine "absolute" age for deposits containing bones. These are the first dinosaur body fossils found on the North Slope west of Umiat.

Other dinosaur fossils found elsewhere in Alaska

Black Lake area on Alaska Peninsula: 1975 discovery of 14 dinosaur footprints of Jurassic age (more than 146 million years old), which makes them the first of this age found in Alaska; tracks probably represent two different meat-eaters but specific types are uncertain.



Western Talkeetna Mountains: the 1990 discovery of a skull found in a creek bed of Late Cretaceous age (68-73 million years old) is an *Edmontonia* (a Nodosaurid Ankylosaur), a four-legged, plant-eater with leathery and bony armor plates across its back; six feet tall, 23 feet long, four tons weight.



Central-Western Talkeetna Mountains: 1994 discovery of a 90-million-year-old hadrosaur (genus uncertain). This discovery includes the most bones from a single dinosaur yet found, but the skull is missing. It is the oldest hadrosaur known in Alaska and one of the oldest in North America. The specimen probably was a juvenile or young adult, five-to-six feet tall, nine feet long, and 300-400 pounds.

Aniakchak National Park & Preserve: 2001-2002 discovery of two tracks of a 3-toed 65-75-million-year-old Ornithomimid (Ornithomimid?) on a river estuary beach, about 420 miles southwest of Anchorage. This extends the known range of this type of dinosaur and is the first evidence of Late Cretaceous age dinosaurs from this part of Alaska.

Other dinosaur (non-bone) fossils found on the North Slope

North Slope, various locations: 1970s and later, mostly limited discoveries of dinosaur skin imprints and footprints in different areas.

North Slope, Colville River drainage: 1998 discovery of major trackways which provide evidence of seven different meat- and plant-eating dinosaurs including the oval-shaped tracks of a yet unknown species; the new discoveries date from the middle Cretaceous, about 90-110 million years ago.

Dinosaurs on Alaska's North Slope

Dinosaur discoveries

In the 1980s, the first dinosaur bones discovered on the Alaska North Slope belonged to the duck-billed *Edmontosaurus*. Fully grown, these plant-eaters could reach 10 feet tall, 40 feet long and weigh three tons. These dinosaurs are thought to have lived in social groups or herds.

How did they survive so far north? Did they slow their metabolism or hibernate? Did they migrate southward for food and warmer climates?

No one knows the exact answers to these questions, but new discoveries on the Colville River throw doubt on the migration theory. Several new dinosaurs, including small meat-eaters such as the *Troodon* and *Dromaeosaurus* probably couldn't physically migrate the round-trip distance of 5,000 miles. Instead, North Slope dinosaurs may have survived year-round on ancient river systems which supported lush summer vegetation. Enough seasonal vegetation may have grown during the 24-hour sunlit summers to last during the cool-to-cold dark days of winter.

Dinosaur extinction

Did a meteorite strike the earth, throw up dust to block the sun, and possibly cause the extinction of dinosaurs 65 million years ago? Maybe, but then why did certain reptiles, including crocodiles, turtles, and snakes, survive? A few paleontologists suggest that disease may have been a factor. Others point to the possibility of climatic changes caused by increased

volcanism or changing vegetation unfavorable to some dinosaurs. Current thinking is that the dinosaurs died off from a combination of causes.

Were North Slope dinosaurs "warm-blooded" or "cold-blooded"?

In the past, paleontologists assumed all dinosaurs were cold-blooded. Only in the 1960s, did scientists begin entertaining the possibility that dinosaurs could be warm-blooded.

The bone cross-sections of warm-blooded mammals have more blood channels while the bones of cold-blooded reptiles have fewer channels. Some dinosaur bones show a combination of both patterns, with more blood channels as juveniles, and fewer channels in adults. North Slope dinosaurs so far exhibit a juvenile pattern. The debate isn't settled. It may be these dinosaurs had unique metabolisms unlike animals today.

DNA studies and North Slope dinosaur bones

So far, no DNA has been found in dinosaur bones of the North Slope.

The highly mineralized bones of these dinosaurs haven't yielded any bone tissue from which DNA could be retrieved.

Although not proven, the best candidates for containing recoverable biomolecular material and maybe even DNA are dinosaur bones with lots of silica mineralization. There is the possibility that the silica could have encapsulated and helped protect some original cell matter. Whether such ancient material exists, or whether it could be viable or extractable, is also unknown.

Twelve known dinosaur types have been found on the North Slope, while evidence for a 13th is under review. All are about 68-73 million years old and are from the Late Cretaceous Period.

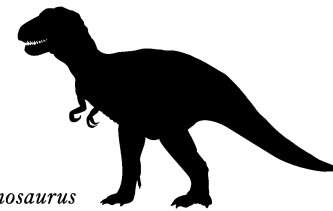
Meat-Eaters

Theropods were fast-running, meat-eating dinosaurs of various sizes with sharp serrated teeth. They are thought to have hunted in packs or social groups. They walked on two legs. Theropods found so far are grouped into four families:

Family #1:
Tyrannosaurids had massive heads and very reduced arms. Two types known:



Albertosaurus
up to 10 feet tall, 15-17 feet long, a smaller "cousin" of the famous *T.rex*; Found in Alaska: isolated teeth and rare bones of a smaller adult or juvenile.



Tyrannosaurus
under 15 feet tall, 10-15 feet long, species not known; specimen probably an earlier "cousin" of *T.rex*, same genus; Found in Alaska: a single tooth.

Family #2:
Troodontids had relatively large brains. Their large eyes possibly were better adapted for hunting during twilight or at high latitudes. One type known:



Troodon
small, lightly built, six feet high, eight feet long, weighed several hundred pounds; most common Theropod according to abundance of teeth found. Found in Alaska: teeth and skull fragments.

Family #3:
Dromaeosaurids were possibly the fastest, fiercest predators of any kind. Two types known:

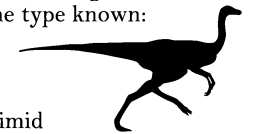


Dromaeosaurus
small, lightly built, around four feet tall, six feet long, 100 pounds; a "cousin" to the scary *Velociraptor* made famous in the movie *Jurassic Park*; Found in Alaska: isolated teeth and a single tail vertebra.



Saurornitholestes
very similar to *Dromaeosaurus*, four feet tall, six feet long, 100 pounds; Found in Alaska: isolated teeth and vertebrae.

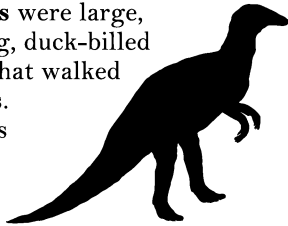
Family #4:
Ornithomimids were relatively small, ostrich-like meat- and plant-eating dinosaurs that walked on two legs; had small, light heads, relatively big brains, large eyes, and long narrow toothless beaks. One type known:



Ornithomimid
genus uncertain; up to 11-19 feet long, over 200 pounds; Found in Alaska: single foot bone (metatarsal).

Plant-Eaters

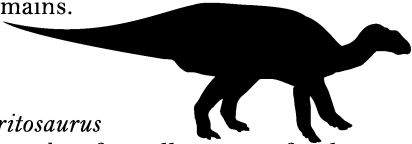
Hadrosaurs were large, plant-eating, duck-billed dinosaurs that walked on two legs. Three types known:



Edmontosaurus

10 feet tall, more than 40 feet long, weighing up to three or more tons, non-crested, most common type known;

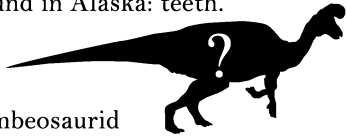
Found in Alaska: teeth and more than 60 percent of its bones; juveniles and young adults dominate recovered remains.



Kritosaurus

around 10 feet tall, up to 30 feet long, weighing about three tons, non-crested;

Found in Alaska: teeth.



Lambeosaurid

(Identity under review with its presence in Alaska uncertain)

crested but genus uncertain; can be more than 10 feet tall, up to 50 feet long, weighing more than three tons; Found in Alaska: teeth and upper jaw.

Hypsilophodontids were small, swift-running, plant-eating dinosaurs that walked on two legs. One type known:



Thescelosaurus

less than five feet high, 11 feet long, 200 pounds;

Found in Alaska: teeth and toe bone.



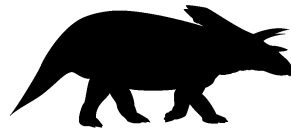
Paleontologists excavate Late Cretaceous dinosaur bones in the vertical banks of the Colville River on Alaska's North Slope.

Ceratopsians were large, plant-eating, horned dinosaurs that walked on four legs. Two types known:



Pachyrhinosaurus

seven feet high, 18 feet long, weighing up to four tons; Found in Alaska: partial upper skull frill, horn core and shoulder blade.



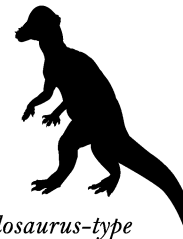
Anchiceratops-like form

up to seven feet high, 16-20 feet long, weighing up to four tons;

Found in Alaska: part of rear end of skull.

Pachycephalosaurids were relatively small, plant-eating dinosaurs that walked on two legs; notable for having thick-domed skulls suggesting that some may have used them for head-butting, or some other ritual combat. Recent studies indicate domes may be an adaption for heat dissipation or loss.

One type known:



Pachycephalosaurus-type

up to 6 feet tall, 3-15 feet long, 300 pounds; genus uncertain;

Found in Alaska: egg-sized skull fragment.

How to speak dinosaur

<i>Albertosaurus</i>	AL-BERT-to-SORE-us
<i>Anchiceratops</i>	AN-ki-ser-ra-tops
<i>Ceratopsian</i>	SERRA-tops-ee-n
<i>Dromaeosaurus</i>	DROH-may-oh-SORE-us
<i>Edmontosaurus</i>	Ed-MON-toh-SORE-us
<i>Edmontonia</i>	Ed-mon-TOE-ne-ah
<i>Hadrosaur</i>	HAD-roh-sore
<i>Hypsilophodontid</i>	Hip-sih-LOE-foe-don-tid
<i>Kritosaurus</i>	KRITE-oh-SORE-us
<i>Lambeosaurid</i>	LAMB-ee-oh-sore-id
<i>Ornithomimid</i>	Or-NITH-o-MIM-id
<i>Ornithopod</i>	Or-NITH-o-pod
<i>Pachycephalosaurus</i>	PAK-ee-sef-a-loe-SORE-us
<i>Pachyrhinosaurus</i>	PAK-ee-RINE-oh-SORE-us
<i>Saurornitholestes</i>	Sore-OR-nith-oh-LES-teez
<i>Thescelosaurus</i>	Thes-kel-oh-SORE-us
<i>Theropod</i>	THER-oh-pod
<i>Tyrannosaurus</i>	Tie-RAN-oh-SORE-us
<i>Troodon</i>	TROH-oh-don